Heavy Vehicle Essential Power Systems Workshop



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DOE/OHVT Essential Power Systems Workshop Washington, D.C. December 12 - 13, 2001



OHVT Mission

To conduct, in collaboration with our heavy vehicle industry partners and their suppliers, a customer-focused national program to research and develop technologies that will enable trucks and other heavy vehicles to be more energy efficient and able to use alternative fuels while simultaneously reducing emissions.



What is "Essential Power"?

- □ Essential power is a crosscutting technology area that addresses the efficient and practical management of electrical and thermal requirements on trucks
- Essential Power Systems: any function on the truck, that is not currently involved in moving the truck, and requires electrical or mechanical energy.
 - Truck Lights
 - Hotel Loads (HVAC, computers, appliances, lighting, entertainment systems)
 - > Pumps, starter, compressor, fans, trailer refrigeration
 - Engine and fuel heating
 - Operation of power lifts and pumps for bulk fluid transfer



21st Century Truck Auxiliary Power - Vision

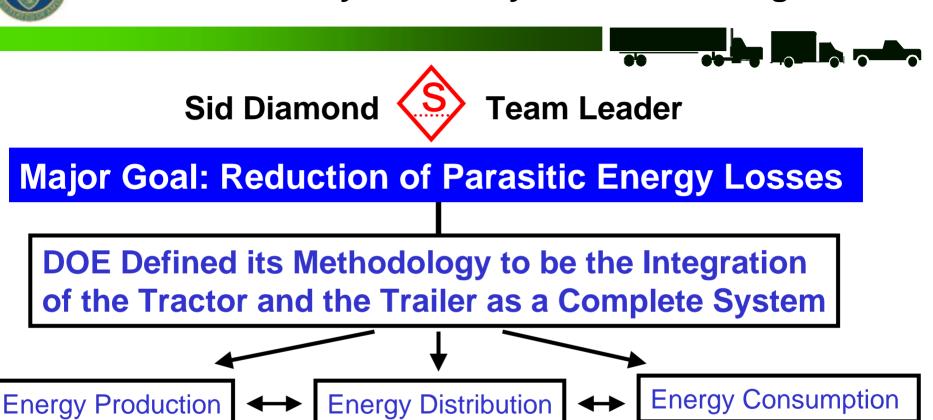


- Transition from "belt and gear driven" to auxiliary power generation of electricity - "Truck Electrification"
- □ 42 volts, DC and/or AC
- □ All electrically driven auxiliaries
- □ Power on demand manage electrical loads
- Benefits include: increased fuel efficiency, reduced emission

.... both when Truck is Idling and moving down the road



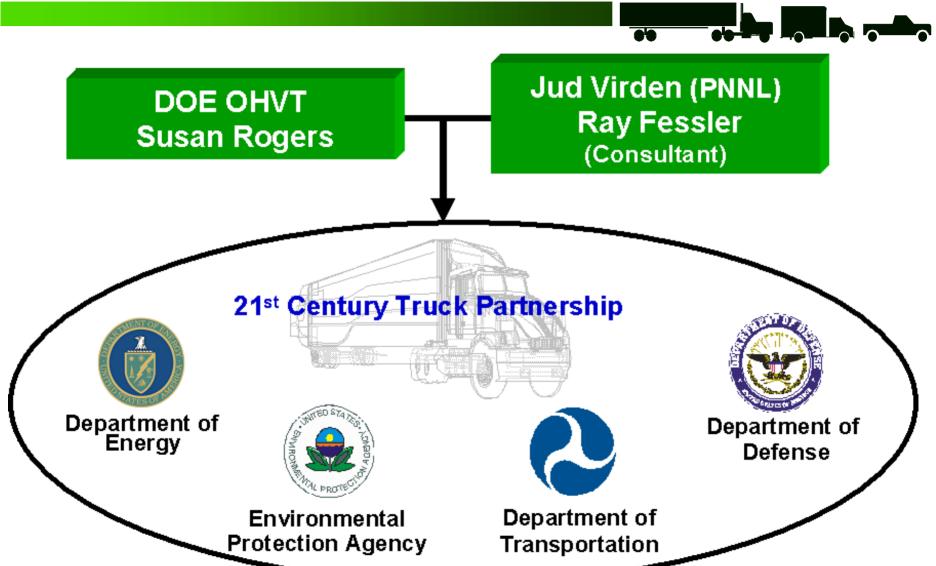
OHVT – Heavy Vehicle Systems Technologies



- Heavy Vehicle Systems Technologies
- High-Strength/Weight Reduction Materials
- Propulsion System Materials
- High Temperature Materials Laboratory



Essential Power Systems R&D



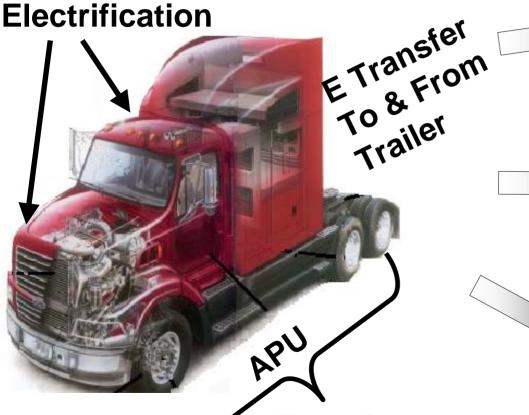


Component

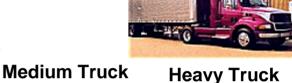
Essential Power Systems (EPS)



Efficient, Low-Emission Heavy Vehicles



Electrical Integration





Bus





Construction/ **Farming Vehicles**



Locomotive

Inland Marine



Example Total Accessory Loads Heavy Truck and Bus Applications



Accessory Type	Max. Load, kW	Avg. Load, kW
Air Compressor	6	2.3
Electrical Accessories	1.0	0.7
Air Conditioning Compressor	4.5	2.2
Engine Cooling Fan	22.0	1.1
Power Steering	7.5	0.8
Total	41	7.1

Loads are for trucks while driving, during the day with no rain, with cab and sleeper heaters on.

Ref. SAE J1343 Revised Aug. 2000



Workshop on Heavy Vehicle Essential Power Systems R&D



Purpose

To craft a shared vision for Industry-Government R&D collaboration in Essential Power Systems to improve fuel efficiency and minimize heavy vehicle emissions and while maintaining or enhancing system performance.



R&D Needs for Low-Emission, Energy-Efficient Heavy Vehicles



Within the context of improving energy efficiency and reducing emissions through more or total electrification of the heavy vehicle system what are the high priority R&D opportunities for Industry/Government collaboration?

How can R&D resources be leveraged to meet industry needs?

What are the technical barriers and recommended R&D?

What Federal & Industry resources are needed to accomplish identified programmatic goals?



EPS Schedule



- □ Initiate Technology Options Study August 2001
- □ EPS workshop December 2001
- Multiyear R&D Program Plan early 2002
- □ RFP early 2002
- □ Solicitation awards Summer 2002



Heavy Vehicle Systems Technologies



Program Portfolio

#	Project Descriptions	FY02 Estimate
1	Heavy Vehicle Systems (Taxes)	1,198.000
2	Outreach	105.000
3	Life Cycle Analysis	230.000
4	Tech. Prog. Mgr.	250.000
5	Advanced Filtration	300.000
6	Diesel Reformer	150.000
7	Thermal Management	475.000
8	Plasmatron Development	250.000
9	Aerodynamic Drag - CFD	400.000
10	Aerodynamic Drag - RANS	225.000
11	Aerodynamic Drag - Flow Field	200.000
12	Aerodynamic Drag - Vortex Methods	135.000
13	Aerodynamic Drag - Wind Tunnel Testing	400.000



Heavy Vehicle Systems Technologies



#	Project Descriptions	FY02 Estimate
14	Aerodynamic Drag - Pneumatic Devices	200.000
15	Brake Pad and RotorSystem	120.000
16	Friction/Wear Boundary Layer Lubrication	470.000
17	Regenerative Shocks	135.000
18	Off-Highway Solicitation	500.000
19	Axle Friction reduction	470.000
20	Reduction of thermal loads	125.000
21	More Electric Truck	500.000
22	Ceramic Composite Brake Rotors	200.000
23	Characterization of Diesel Particulates	230.000
24	CFD of Underhood Thermal Management	150.000
25	Full Scale Wind TunnelTest	700.000
26	Brake Materials	100.000



Heavy Vehicle Systems Technologies



#	Project Descriptions	FY02 Estimate
27	Aerodynamic Drag Workshop	40.000
28	Turbulence Modeling using CFD	200.000
29	Friction and Wear	150.000
30	High Temperature Coolants	50.000
31	Essential Power System	500.000
32	Thermal Management through Graphite Foams	100.000
33	Thermal Mangement of Cab	0.000
34	Truck Anti-Idling	10.000
35	Anti-idling	0.000
36	Locomotive Systems	500.000
37	Other Truck Safety Systems	137.000
38	Truck Innovative Concepts	75.000
		9,980,000.000